

I LIKE IT BECAUSE I('M) LIKE YOU – MEASURING USER ATTITUDES TOWARDS INFORMATION ON FACEBOOK

Completed Research Paper

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Abstract

Limited in motivation and cognitive ability to process the increasing amount of information on their Newsfeed, users apply heuristic processing to form their attitudes. Rather than extensively analysing the content, they increasingly rely on heuristic cues – such as the amount of comments and likes as well as the level of relationship with the “poster” – to process the incoming information. In the paper we explore what impact these heuristic cues have on the affective and cognitive attitude of users towards the posts on their Newsfeed. We conduct a survey on based on a Facebook application that allows users to evaluate Newsfeed posts in real time. Applying two distinct panel-regression methods we report robust results that indicate that there is a certain relationship primacy effect when users are processing information: only if the level of relationship with the “poster” is low, the impact of comments and likes on the attitude is considered, whereby likes trigger positive, whereas comments – negative evaluations.

Keywords: information overload, heuristic information processing, heuristic cues, attitude

Introduction

One of the most visited websites in the world, the Social Network Site (SNS) Facebook has an astonishing 750 million users (2011), and is by far integrated into the daily life of most of them. Its popularity lies in providing the opportunity for users to share their daily experiences, memorable moments, thoughts, feelings and opinions with each other. Facebook is by now the largest database of social information in the world, increasing at a rate of 30 billion pieces of shared content per month (Facebook 2011). By commenting on the posts of each other users communicate in a new way on Facebook – through the stream. Stream communication does not require direct reciprocity, while its public nature allows to involve more people into the active network and to expand communication beyond usual boundaries (Sandberg 2009).

By delivering a real-time summary of friends' activities, the information on the Newsfeed provides users with a myriad of benefits. Stream communication alone is enough to generate a sense of connectedness between users (Köbler et al. 2010), expressed in the feeling of staying in touch. Indeed, simply having someone in the network and 'liking' the posts of this person from time to time does not cost much effort but brings a lot in terms of relationship maintenance. By reciprocally sharing information, users feel that they are gaining social capital (Morris et al. 2010), as well as provoking offline meetings and events (Köbler et al. 2010). In fact, Ellison et al. (2007) empirically show that intensity of Facebook use is associated with bridging and bonding social capital.

At the same time, increased information sharing on the Newsfeed may lead to *information overload* – referring to the emotional state of dissatisfaction with the high amount and low quality of information (Schneider 1987). Unable to process the information presented to them, users experience confusion, stress and anxiety (Eppler and Mengis 2004). Koroleva et al. (2010) in their qualitative study show that users feel overloaded with information on their Newsfeeds, which may result in reduced activity on the network, negatively impact the attitude towards the Newsfeed, diminish benefits of participation, and in the long-run undermine platform sustainability. Thus, information overload represents an acute phenomenon to be studied on SNS.

Despite the earnestness of these risks, little systematic research exists investigating the dynamics behind user perceptions towards information on their Newsfeed as well as the psychological processes by which social information is processed. In an attempt to fill this gap, we investigate how users process information on their Newsfeed and how their attitudes are formed as a result. Our aim is to empirically determine what impact the peripheral cues (such as number of likes and comments) and the relationship characteristics between users have on what users like and consider useful on the Newsfeed. By identifying which factors and how determine the attitude towards the post, our study provides a solid background for the improvement of information filtering mechanisms for social media applications.

In this paper, after an overview of the existing literature on information processing, we proceed to derive our hypotheses. Subsequently, several empirical models are tested via two distinct panel regression methods. To conclude, we discuss our findings and provide implications for network providers.

Theoretical Model of Attitude Formation

Theoretical Background

One of the main questions addressed in this study is how users process information on their Newsfeed. Information processing referring to individual's cognitive processes, such as screening, comprehending, evaluating, interpreting and using information (Schick et al. 1990), is necessary to form attitudes. Indeed, certain cognitive resources need to be activated in order to process information inputs into outputs, i.e. form a corresponding attitude towards the post on the Newsfeed: attention and motivation, retrieval of certain knowledge structures from memory, comparison of obtained information with existing structures (Driver and Streufert 1969). The cognitive effort of reading a single post may be minimal, but on the Newsfeed users are faced with a myriad of posts every day: Facebook reports that each user creates ca. 90 pieces of content a month. Large amounts of input (Schneider 1987) and its possible complexity (Driver and Streufert 1969) increase the processing demands and may result in information overload. The consequences of information overload may cause stress and anxiety (Eppler and Mengis 2004) or have a

detrimental impact on decision quality, confirmed in numerous studies (e.g. Chen et al. 2009). The feeling of information overload on the Newsfeed (Koroleva et al. 2010) deprives users of the ability to attend to every message that is posted and forces them to adopt certain strategies to select the information they like and find useful.

In order to form the attitudes, users can either evaluate the content of the message and the internal cues contained in it or focus rather on other external peripheral cues (Wood et al. 1985). Depending on the amount of available resources, time and motivation to process information, on the one end of information processing continuum is the heuristic and on the other - systematic information processing strategy (Bohner et al. 1995). Systematic processing is a bottom-up approach, involving extensive evaluation of arguments and issues involved in a message (i.e. its content) and comparing that information to existing knowledge structures and beliefs (Bohner et al. 1995) in order to arrive at an evaluative judgement. For systematic processing of information, a significant amount of motivation, ability and cognitive resources are required. In contrast, the top-down heuristic processing strategy involves reliance on certain cognitive heuristics – rules of thumb, schemas or other stereotypes – to form attitudes. Cognitive heuristics are mental shortcuts that allow people to form opinions without extensively analysing the contents of the message based on certain cues present in the situation. Under this approach attitudes are formed based on the availability of heuristic cues, without any conscious effort (Ajzen and Sexton 1999). This strategy is employed especially when subjects have little experience with the situation or they are unable or unmotivated to evaluate message validity on their own – that is, they are constrained in their resources.

Cognitive heuristics are gained through past experiences and observations, stored in memory and activated when the message reflects a certain feature – a heuristic cue - that signals its relevance (Chaiken 1980). Users have been found to increasingly base their social judgements on easily processed heuristics when the appropriate heuristic cues are available. Examples of widely employed heuristics, confirmed in numerous experiments, include: “consensus implies correctness” (Maheswaran and Chaiken 1991), “people agree with those they like” (Chaiken 1980), “length implies strength” (Wood et al. 1985), or “expert statements can be trusted” (Chaiken 1980). For example, through past experiences people can learn that a statement that achieves a consensus among a group of people is typically accurate. Thus, with this “consensus implies correctness” heuristic in mind, when faced with a message that reveals the agreement of other individuals on a certain issue (heuristic cue) individuals will tend to simply agree with others (apply the heuristic and form the corresponding attitude). Thus, the individuals form their opinions quickly and efficiently without engaging in extensive evaluation of the message content. Other experiments show that people agree rather with likable than unlikable message communicators (Chaiken 1980), favour messages containing nine as opposed to three arguments (Wood et al. 1985) or employ other kinds of knowledge structures and stereotypes as their heuristics.

We hypothesize that on the Newsfeed users will apply *heuristic* rather than systematic strategy to process the information. First of all, as users are overloaded with the social information they receive each day through the Newsfeed (Koroleva et al. 2010) they are unable to process each piece of information systematically. Sundar et al. (2007) in their study of information processing on the newsbots, such as Google News, find that people rely on heuristic cues to process large amounts of presented news stories, such as: name of the source, recency of the story and the number of related articles. Second, as people are economy-minded individuals, they prefer less effort to more effort, choosing heuristic processing as the default processing strategy (Bohner et al. 1995). Authors find that users will engage in systematic processing only when the personal relevance of the subject (information) is high (Ajzen and Sexton 1999).

Third, the desired confidence level in the formed attitudes towards the posts on the Newsfeed is quite low, as information processing on such social applications as Facebook is usually not very task or goal-oriented (Sundar et al. 2007). Thus on the Newsfeed the sufficiency threshold – referring to the trade-off between the necessary effort and desired confidence level – is set low enough so that it can be achieved by the heuristic processing alone (Bohner et al. 1995). Finally, the posts on the Newsfeed are very rich in heuristic cues, such as the “sender” of the post, the number of comments and likes it receives, type, length, etc. and can easily provide mental shortcuts to users when they are forming their attitudes. For example, the number of “likes” can serve as a heuristic cue and lead users to activate a heuristic similar to “consensus implies correctness” and thus form a favourable attitude towards the post, without the necessity to engage in extensive evaluations of its content.

How are these heuristics formed initially? In order to arrive to an evaluative judgement about the post and store the corresponding beliefs and heuristics in memory, initially users need to evaluate both the content of the post and the peripheral cues it contains. Such systematic processing will usually occur either if no other heuristics are present or if the personal involvement with the contents or the “poster” of the message is high. If users possess enough motivation and resources, we hypothesize that their attitudes will be formed under the expectancy-value model of Fishbein and Ajzen (1975). Applying this model, we can view the attitude of users towards a post on the Newsfeed as a function of the value of the post and the necessary cost of processing it. Value may be determined by evaluating the content of the post multiplied by the personal relevance of the content for the person. On the one hand, people may evaluate the post positively if the content itself promises certain benefits, for example: provides the person with some valuable information or satisfies curiosity. On the other hand, personal relevance - either with the content of the post or with the person who posted it - tends to increase the value of the post in a multiplicative manner. However, we hypothesize that this form of processing will be rarely utilized on the Newsfeed, as the posts normally possess one of the heuristic cues and will most likely trigger corresponding heuristics.

Recognizing the importance of heuristic cues in the process of attitude formation of users on the Newsfeed, and due to the absence of systematic research on the topic in the context of SNS, in our study we aim to answer the following research questions:

- (i) *Are users indeed processing information heuristically on their Newsfeed?*
- (ii) *What impact do heuristic cues and their interactions have on the attitude towards the post?*

Towards the Empirical Model

As with traditional media, on SNS the source of communication plays an important role for the perception of value of the post (Wilson and Sherrell 1993). In their typology of communication sources Sander and Nass (2001) differentiate between the visible sources or “media gatekeepers”, such as a television narrator, and the receivers of information – the audience members. Applied to our Newsfeed example, the user’s friend who shares the post is the visible source of communication and the number of likes and comments the post has implies the number of other friends who “received” this information. Thus, the three main heuristics employed by the users to evaluate posts on the Newsfeed are on the one hand related to the characteristics of the post, such as the number of comments and the number of likes; and on the other – to the relationship characteristics with the friend who shared the information (further referred to as the “poster” or “sender” of the post). Nowadays studies recognize the technological medium, such as Facebook, as a distinct source of communication as well, but as this source is constant across all posts, we neglect it in our study. We propose that these cues – likes, comments and the level of relationship – are increasingly utilized by users to form cognitive heuristics, which, in turn, help them to evaluate posts on the Newsfeed quickly and efficiently. Thus, when presented with a new post with corresponding heuristic cues, the heuristics stored in memory will be activated in the process of attitude formation.

The dependent variable of our study is the *attitude* of SNS users towards a respective post. Authors recognize a myriad of different dimensions of attitude, such as: extremity, intensity, certainty, importance, accessibility and affective-cognitive consistency (Krosnick et al. 1993). Generally accepting the critique of the uni-dimensional structure of attitudes (Voss et al. 2003) most authors differentiate between its affective and cognitive components (Ajzen 2005; Voss et al. 2003; Yang and Yoo 2004). Cognitive attitude refers to evaluations of the attitude object and the qualities it possesses, whereas affective focuses on how much the person likes the object and is emotionally attached to it (Ajzen 2005). In line with Voss et al. (2003) in our study affective dimension is operationalized by “*like – dislike*” and “*interesting – boring*”, whereas the cognitive qualities of the post are measured via the following indicators: “*useful – useless*” and “*relevant – irrelevant*”. In our study we treat attitude in two ways: uni-dimensionally by delineating the impact of heuristic cues on the cognitive and affective dimensions separately, as well as multi-dimensionally by integrating the explored indicators into one higher-order construct. Although cognitive and affective attitude measures can be operationally distinguished (Ajzen and Sexton 1999), they have found to be correlated (Krosnick et al. 1993; Voss et al. 2003), justifying the taken approach.

The process of attitude formation is a complex one. Cognitive and affective attitude components can exert a distinct influence on the overall attitude towards the post and the resulting behaviour (such as

commenting, liking or simply reading the post), as confirmed in studies. For example, Yang and Yoo (2004) find that in the context of technology acceptance, affective and cognitive attitudes are two separate socio-psychological constructs. More specifically, in the case of the spreadsheet technology, it is the cognitive, and not the affective attitude that is responsible for the behavioural intention. Depending on the contents and other characteristics of the post, the overall attitude may be determined either by cognitive or affective components (Ajzen 2001). For example, affective components play a significant role in the evaluation of posts expressing feelings and emotional states such as: *'I am so happy today'* or *'I am off to Shanghai'*, whereas cognitive components are responsible for determining the attitude towards posts that contain some valuable information: *'Does anyone know a good doctor'* or *'Today a new recipe is added to our assortment'*. The recognized peripheral characteristics of a message, such as the number of comments and likes can also exert differing impact on these two dimensions of attitude, which we seek to explore in this study.

Derivation of Hypotheses

Assuming that on their Newsfeed users process information heuristically, we would like to explore the impact of the three main heuristic cues – number of likes, number of comments and the level of relationship with the “the poster” – in determining user attitude towards the primary post. First, we explore the impact of these three cues as separate antecedent factors of attitude (as depicted in the basic model in figure 1). Second, we aim to identify the impact of the interaction effects between these variables, as we assume that the posts from people with whom the relationship is high are not processed in the same way as the ones with whom it is low. Third, in the post-hoc analysis, we want to explore the role of post type on attitude, as we assume that not all types of posts will trigger identical heuristics.

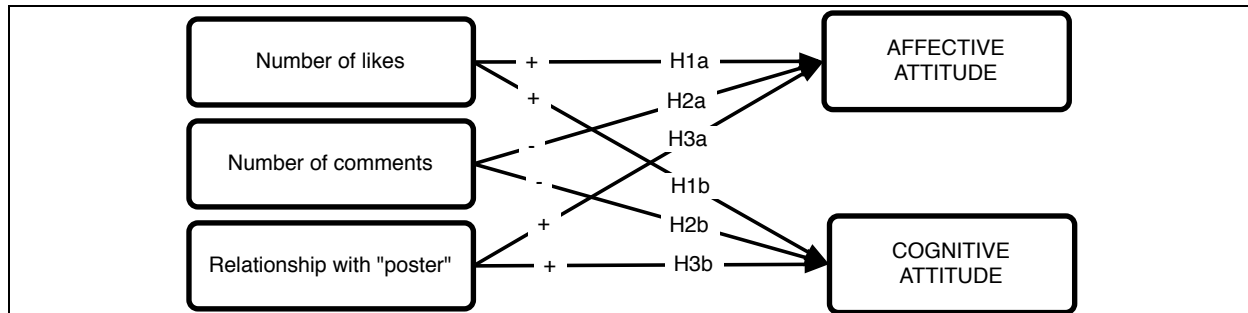


Figure 1. The hypothesized model (basic)

‘Likes’ Heuristic

The number of comments and likes a post receives signals the opinions of other receivers of information (Mishne and Glance 2006). However, these two heuristic cues do not impact attitudes in the same way and tend to trigger different, sometimes even opposing, heuristics. Likes are in general subject to several positively directed heuristics. First of all, a high number of likes signals that people generally agree with the content elaborated upon in the post and thus may activate the already mentioned “consensus implies correctness” heuristic. Authors find that if presented with the opinions of others about something that are in consent, people tend to form a favourable attitude (Chaiken et al. 1989). At the same time, in an explorative study of the correlation between the content of the post and the number of comments and likes it receives, the Facebook data team (2010) uncovers peculiar findings. They report that the posts that receive the most likes are usually positive, express emotions, feelings, optimism or certainty, often include statements about humans or family while not involving lengthy argumentations. Thus, even if evaluated systematically, the posts with a high number of likes are unlikely to cause negative reactions.

Second, a high number of likes can implicitly raise the credibility of the content of a post and induce users to agree with it by triggering a heuristic similar to: ‘If everyone thinks it is good, it must be good’. Sundar and Nass (2001) report that this so-called bandwagon heuristic is the most powerful, inducing respondents to give the highest ratings to news stories selected by other users as opposed to those selected by news editors and even the users themselves. Thus, the user may simply adopt the majority position,

without extensive evaluation of the message content – confirming the herding behaviour hypothesis explored in numerous studies (Baddeley 2010; Walden and Browne 2009). Following others is easier than forming opinions on one's own, and thus users are easily influenced by the 'likes' heuristic when forming their attitudes. Finally, as likes signal the position of the majority of their friends, users with impression management motives (Bohner et al. 1995) will not want to deviate from others and tend to like the posts that have achieved consensus among their friends.

Likes signal the feelings and emotional states of other recipients of information and thus should especially impact the affective attitude of users towards the post. At the same time, likes can also signal the quality of content and thus tend to enhance cognitive post evaluations as well. Therefore we hypothesize that:

The number of likes will correlate positively with the perception of likability (H1a) and the perception of usefulness (H1b) of the posts on the Newsfeed.

Comments Heuristic

As opposed to the posts with the most likes, the posts that receive a high number of comments are usually the ones expressing tentative things, negative emotions, anger, discrepancy, sadness, anxiety or fear (Facebook data team 2010). Thus, commented posts tend to have a negative connotation, ask for feedback or express a controversial opinion. Such posts may signal controversy between the receivers of the information and therefore, put the validity of its content into question. Maheswaran and Chaiken (1991) find that if the information in the post is incongruent, users are forced to engage in systematic processing to arrive at their own evaluations. By signalling disagreement, the high number of comments may result in a gap between the actual and desired confidence in post evaluation (Bohner et al. 1995) and induce users to process information systematically.

However, in order to evaluate the message on their own, the comments need to be processed, which usually stem from others rather than the "sender" and thus represent additional involuntary information to be processed for which a high motivation and cognitive ability are required. However, as we already mentioned, on the Newsfeed information processing is not task-oriented, and users do not necessarily have to process all the posts with a large number of comments to arrive at an evaluative judgement. Thus, in order to avoid the necessity to extensively analyse the post with a lot of comments, the user can simply adjust her attitude towards it. Authors show that if other persons appear to oppose the message's position, its content may be evaluated negatively (Chaiken et al. 1989). Thus, a high number of comments on any post will negatively impact the attitude towards it.

By presenting a user with a summary of opinions of others, comments may help to evaluate the quality of the post shall the user want to engage in systematic processing and thus are prone to impact the cognitive evaluations of users. At the same time, a large number of comments can trigger irritation and feelings of information overload, evidenced for example by Jones et al. (2004), and thus have an impact on the users' affective states. Therefore we hypothesize that:

The number of comments will correlate negatively with the perception of likability (H2a) and perceptions of usefulness (H2b) of the post on the Newsfeed.

Level of Closeness Heuristic

The role of the visual sources of information on the Newsfeed is performed by the "senders" of information, i.e. the user's friends. They not only perform an important information filtering function (that is, decide what information to post), but also take the role of directly interacting with the user. The "senders" determine the way they transmit the information to the user and thus play an important role in the attitude formation process. Such attributes of visual communication sources as credibility, physical attractiveness, ideological similarity have been found to consistently impact attitudes (Wilson and Sherrell 1993). For example, people are prone to adopt the opinion of attractive sources as opposed to unattractive ones or readily believe in the presented argumentation if they perceive a visual source as an expert (Petty et al. 1983). In the SNS context, Morris et al. (2010) find that the closeness of the relationship with the asker is an important motivator of receiving feedback on status updates. Sundar et al. (2007) find the credibility of source as one of the main heuristics people use when processing news stories that exerts a

positive impact on the attitude. Thus, a high level of relationship with the “sender” of the post will have a positive impact on the attitude towards the post from this person on the Newsfeed.

However, which strategy will be applied to process information from a close friend remains ambiguous. When confronted with posts from people with whom users maintain a close relationship, a so-called high involvement situation can be created which boosts the degree of importance and personal relevance of the post (Kokkinaki and Lunt 1998). In this case, users possess enough attention and motivation to process information systematically (Barki and Hartwick 1989). However, authors find that in the conditions of high involvement posts tend to also be evaluated heuristically as the beliefs necessary to evaluate such posts can either be already stored in memory or instantaneously formed in response to the available heuristic cues, without any conscious effort (Ajzen and Sexton 1999). Thus, high level of closeness may serve as a heuristic that increases the value of the post, and has a favourable impact on the attitude without the necessity to engage in the evaluation of its content. In the end, how bad can something be that is posted by a close friend? In contrast, when the relationship with the “poster” is weak, the beliefs necessary to evaluate the post have yet to be formed by systematically analysing information. As users are constrained in their cognitive abilities and motivation especially to process information from those with whom they do not maintain a high relationship, such posts will coincide with more negative responses.

As the level of closeness is one of the main heuristics when determining the value of the post, we hypothesize that it will have impact on both cognitive and affective dimensions of attitude:

The high level of closeness with the “poster” will correlate positively with the perception of likability (H3a) and usefulness (H3b) of the post on the Newsfeed.

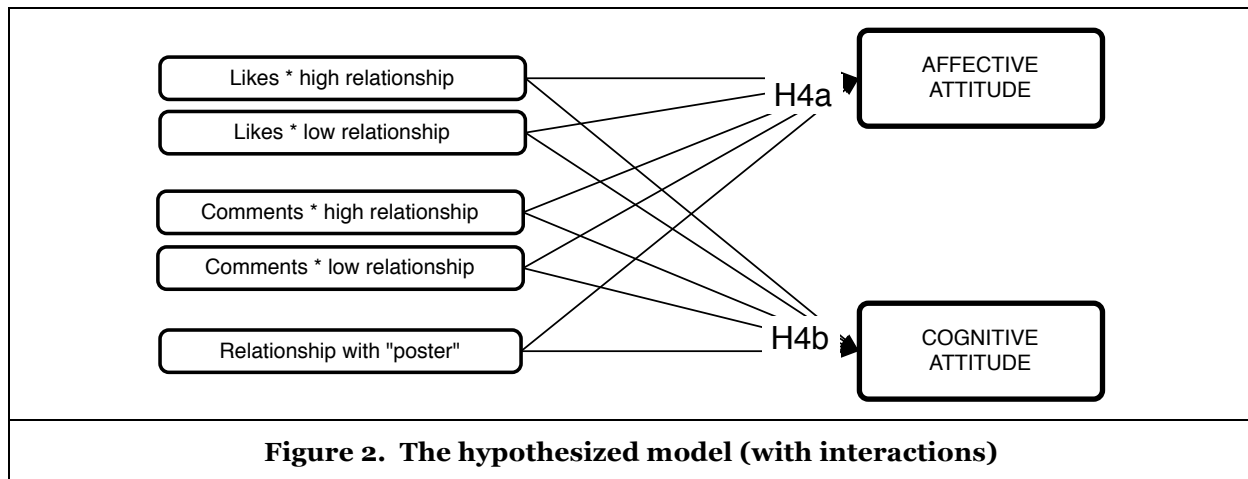
Interactions and the Extended Model

As the friend who shared the information cannot be treated separately from the post on the Newsfeed, the impact of other message cues – the number of comments and likes – will most likely be moderated by the level of closeness. We hypothesized that the level of closeness will have a positive impact on the attitude of users towards the post. But how will this attitude change, if a post from a close friend additionally has received a lot of comments? Or in general, how do peripheral cues and modes of information processing interact? There are several options. First, following the additivity hypothesis adopted in the social psychological literature several cues can exert independent, additive effects on the attitude (Chaiken 1980). Thus, the impact of heuristic cues will add up to what Sundar et al. (2007) call a cue-cumulation effect, where two cues will lead to higher evaluations than just one. Applied to our case, if a post coming from a close friend has received a lot of likes, the positive impact on the attitude will be enhanced. However, cues cumulate only if they trigger the same (Chaiken 1980) or at least similarly directed heuristics. In one of our interaction cases, however, the number of comments will activate a negative, whereas the number of likes – a positive heuristic, so the ability to discern the cumulative impact of these two cues on the attitude with the additivity hypothesis will be constrained.

Another – the sufficiency principle – suggests that people are cognitive misers aiming to reduce the required effort when evaluating posts and would not process more cues than absolutely necessary (Chaiken et al 1989). Thus, if one of the cues is sufficient to form the attitude, other cues would not matter. Sundar et al. (2007) in their study find support for the so-called source primacy effect: source is the most important heuristic and only when the source heuristic is low, users will consider other heuristics in forming their opinions. Similarly, we hypothesize that the level of relationship with the “poster” is the primary heuristic on which to base the attitude, and will thus tend to override the impact of other peripheral cues (number of comments and likes). More specifically, if the level of closeness with the “poster” is high, the attitudes of users will not be very much influenced by other heuristic cues. If, however, the level of closeness is low, the users will increasingly rely on the amount of likes and comments in order to form their attitudes towards the post. In the next step, we want to test these two propositions: the additivity and sufficiency principles for post evaluations on the Newsfeed.

As we believe that the level of closeness with the “poster” is the most important heuristic users apply to evaluate posts on their Newsfeed and can thus influence other relationships in our model, in the second step we interact level of closeness with the amount of comments and likes and explore the impact of these interactions on the dimensions of attitude. Level of relationship is measured by a dummy variable which equals to one if the relationship with the user is “very close” or “quite close” and zero in all other cases.

This interaction results in four additional variables, two if the relationship with the “source” is high, and two if relationship is low. In the extended model (depicted in figure 2), we want to explore the impact of each of these moderating factors on the two dimensions of attitude.



In addition, the type of the post - status update, link or photo – is likely to be important in determining user attitudes. For example, Burke et al. (2009) underscore the importance of photo sharing on Facebook: the photo application generates twice as much traffic as the next three largest photo sharing websites. We want to explore the impact of post type in the post hoc analysis by testing our model for each post type: photos, links and status updates separately. We assume that the role of the cognitive heuristics might be different depending on which type of post it is. For example, by being able to visualize large amounts of data effectively (Bederson and Schneiderman 2003), pictures can trigger the well-known “a picture is worth a thousand words” heuristic, and be less prone to other cues such as the number of comments and likes. We are not formulating any specific hypotheses, but aim to explore what impact heuristic cues have on the dimensions of attitude, if differentiated by post type.

Empirical Study

Survey Design and Sampling

The survey was designed and registered as a Facebook application. In order to take part in the survey, users had to log-in to their Facebook accounts and install the application, after which they were asked for permission to access 6 posts on their Newsfeed in real time. The posts were retrieved from the Facebook database using Facebook query language (structure similar to SQL), which is an API (application programming interface) provided by Facebook (Facebook 2010). Out of all available posts on the user's Newsfeed over the last 72 hours, 3 status updates, 2 links and 1 picture were randomly selected and presented for evaluation one at a time together with an integrated survey tool.

The invitations to install the application and take part in the survey were posted on numerous Facebook groups, as well as virally marketed through friends and friends of friends of the authors. At the end of the survey, users were “rewarded” with the scores reflecting their Facebook usage patterns. In total, 158 people completed the survey. As each user evaluated up to 6 posts, 930 observations were obtained. After removing respondents with outliers and/or unbalanced number of posts (less than 6), 810 observations from 135 respondents were left for analysis.

Development of Measurement Scales

Most of the items used in the survey had to be adapted to the Facebook context. First, respondents were presented with a set of questions about the attitude towards the presented post. As we wanted to measure attitude multi-dimensionally, respondents were presented with 4 attitude-related questions. Affective attitude was operationalized as the likability of the post (*like very much – dislike very much*), as well as the interest level of the post (*very interesting – very boring*). Cognitive attitude was measured by

perceived usefulness (*very useful – very useless*) and relevance (*very relevant – very irrelevant*) of the post. All attitude items were measured on a 6pt ordinal scale. The ‘neutral’ answer option was omitted in order to induce the users to make their choice into a particular direction. Authors believe that if given the possibility to answer neutrally users would prefer this option in order to avoid engaging in the complex process of attitude formation (Friedman and Amoo 1999). Second, the level of closeness with the “poster” (*How well do you know this person?*) was tested on a 5-point ordinal scale: *very well - don’t know at all*. Third, the objective post characteristics were recorded by the application automatically: post type (status update, photo or link), the number of comments and likes. Additionally, usage frequency of Facebook and the demographics (gender, age and country of origin) were collected.

Descriptive Statistics

Our sample of 135 people consists of 51% male and 49% female respondents. 80% of respondents are below 30 years old, with the age range from 21 to 55 years old. Considering that 70% of Facebook users are between 18 and 44 years of age (insidefacebook.com 2010a) and 55.60% of Facebook users are female (insidefacebook.com 2010b), our sample is representative for a significant part of Facebook population. Respondents are frequent users of Facebook: 82% log-in at least once a day, a quarter of whom have Facebook running in the background when they are online. Our respondents maintain considerably large networks: the mean number of friends is 242 and the median 196, which is higher than an average of 130 reported by Facebook (2011). By and large, our sample is representative of largest segment of Facebook audience: young active users.

| Table 1. Cross-Tabulation of affective and cognitive dimensions of attitude | | | | | | | |
|--|----------------------|-------------|---------------------|--------------------|-------------|----------------|--------------|
| affective / cognitive ATTITUDE | extremely useless | useless | slightly useless | slightly useful | useful | very useful | TOTAL |
| dislike very much | 3.7% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 3.8% |
| dislike | 5.6% | 3.2% | 0.7% | 0.0% | 0.0% | 0.2% | 9.8% |
| slightly dislike | 6.8% | 5.2% | 2.3% | 1.1% | 0.0% | 0.1% | 15.6% |
| slightly like | 6.5% | 9.4% | 8.5% | 11.5% | 0.7% | 0.5% | 37.2% |
| like | 1.6% | 3.5% | 4.4% | 7.4% | 5.7% | 0.9% | 23.5% |
| like very much | 0.5% | 0.5% | 0.5% | 2.2% | 3.7% | 2.8% | 10.2% |
| TOTAL | 24.7% | 21.9% | 16.5% | 22.2% | 10.1% | 4.6% | 100.0% |

What concerns the total of 810 posts that were analyzed by 135 respondents, we can see that posts differ with respect to their cognitive and affective evaluations. Based on the cross-tabulation of the indicators of attitude presented in table 1 we can observe quite interesting dynamics. Especially at the edges the affective-cognitive evaluations rarely coincide: 24.7% of posts are rated as extremely useless, whereas only 3.8% are very much disliked. This cognitive-affective inconsistency can be best observed by comparing the values in the lower-left with the upper-right triangle of the table: the users seem to like useless posts but rarely find unlikeable posts useful. Likeability is thus either the result a post being entertaining, but useless (e.g. think of a link to a funny sketch on a video sharing site), or the post being useful (e.g. a status update of a friend indicating that she came back from vacation and wants to go out tomorrow evening). These descriptive findings strengthen the necessity to differentiate between the cognitive and affective dimensions to explore the attitude formation process on the Newsfeed.

The identified discrepancy can in part be explained by closeness. We find descriptive evidence, studied more formally further on, that closeness correlates strongly with likeability of a post, i.e. 80.9% of all posts from close friends (34% of all posts), are evaluated in the range ‘slightly like – like very much’. Usefulness, on the other hand, seems distributed more independently of closeness, i.e. 69.6% of posts from not close friends as opposed to some 50% of posts from close friends are rated in the range ‘slightly to extremely useless’. These descriptive findings, conditional on closeness, furthermore underline the need to include the relationship between the respondent and sender explicitly as a mediator in our empirical specification.

Empirical Operationalization

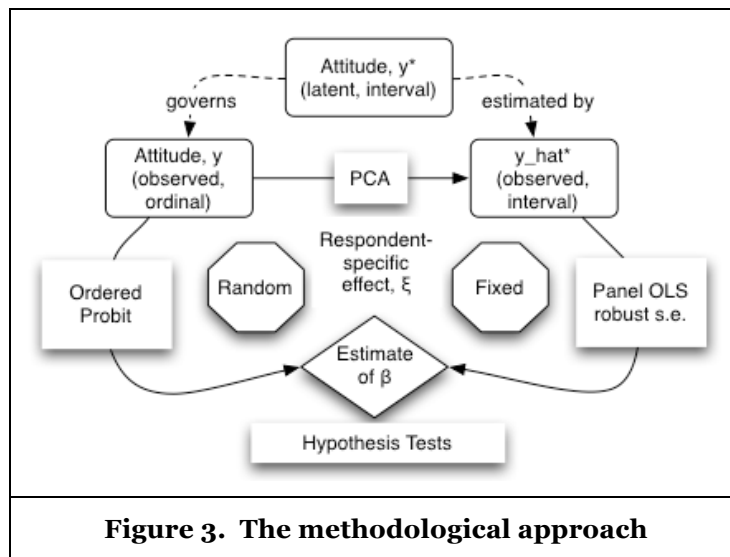
We assume that the respondent's attitude towards a post, as measured by respondent's answer y , is governed by a latent variable y^* which can be viewed as a linear function of a set of respondent-specific characteristics, ξ , post-specific characteristics $X'\beta$ and a random post-specific disturbance term. Our basic model can then be represented as:

$$y^* = X'\beta + \xi + \epsilon$$

Here the columns of k by n matrix X contains our set of explicitly included variables, and the k by 1 vector β is a set of coefficients, where the sign of the β_k indicates the relationship between the k^{th} variable and the respondent's attitude towards that post.

In order to ensure that our results are not driven by the employed empirical specification, the derived hypotheses are tested via two distinct methods (see figure 3 below). Note that because six different posts were evaluated by each respondent, it is possible to apply panel-data methods in order to eliminate the respondent-specific influence, ξ , when estimating the vector β . The first method involves assuming the existence of the latent variable y^* , and then estimating an ordered probit specification, see Greene (2000), directly on the respondent's cognitive and affective post evaluations, while controlling for the respondent-specific influence, ξ , via the inclusion of user-specific random effects (Butler and Moffitt 1982). The advantage of using a limited dependent variable regression approach in this context is that y need not be treated as an interval variable for the purpose of hypothesis testing. Note that treating an inherently ordinal variable as interval ensures that our standard errors are incorrectly estimated leading to spurious inference on the statistical significance of our estimate coefficients. As our attitude variables are ordinal, we can not use more than one indicator to measure their dimensions. Thus, for our estimation models we choose the "usefulness" indicator to evaluate the cognitive and "likability" - to test the affective attitude as we believe that these indicators vividly represent the underlying dimensions.

The assumed relationship between the observed $y_{ij} \in \{0,1,2,3,4,5\}$, for individual i w.r.t. post j , and the latent y^* is determined by a set of unobserved cut-off points, $\{\mu_0, \dots, \mu_4\}$. As moves y^* , from left to right, over a cut-off point, the observed ordinal variable moves up one category. The set of parameters $\{\beta, \mu_0, \dots, \mu_4, \sigma_\xi^2\}$ is then jointly estimated via Maximum Likelihood, where σ_ξ^2 is the variance of the respondent-specific random effect.

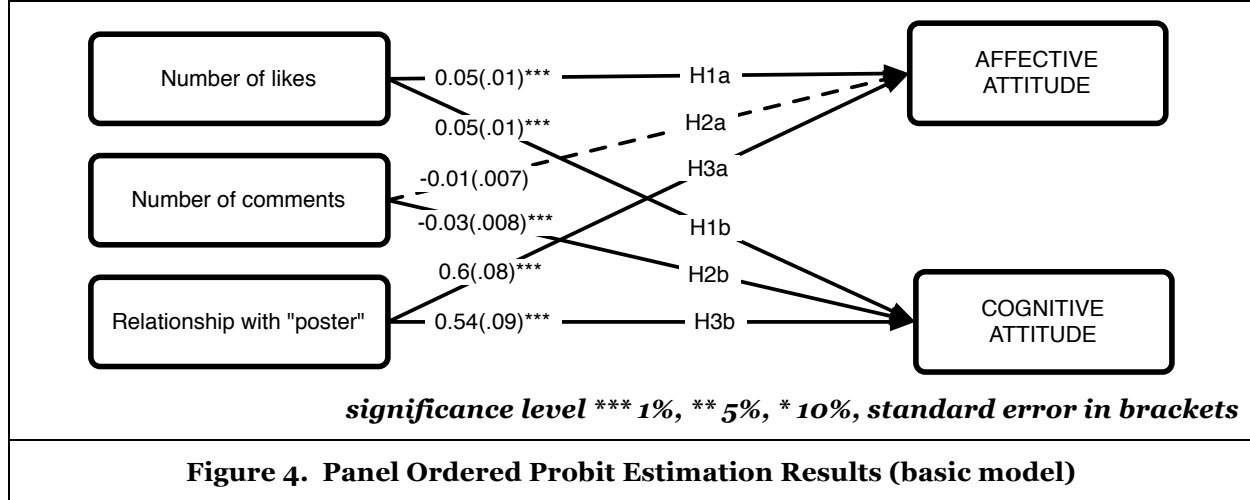


The second method involves using principal component analysis (PCA), see for example Härdle and Simar (2007), to reduce all four ordinal measures of attitude collected in the survey (two indicators for affective and two for cognitive attitude) to one interval variable, \hat{y}^* , which serves as an estimate of the latent variable y^* . For this purpose use is made of so-called polychoric PCA, which is geared for use on ordinal

variables (Kolenikov and Angeles 2004). The principal component, \hat{y}^* , is then linearly regressed on X and the respondent-specific influence, ξ , is controlled for via the inclusion of a respondent-specific fixed effect. The use of fixed effects, which is not possible in the case of the ordered probit specification, bears with it the advantage of being robust in the case of a correlation between the set of explanatory variables X , and the respondent specific effect, ξ . This robustness, however, comes at the price of efficiency; see e.g. Wooldridge (2002). Note that by construction, the estimate \hat{y}^* will be bounded below and above by respectively 0 and 5, making our disturbances heteroskedastic. This issue is in part alleviated via the use of a heteroskedasticity-robust covariance estimator, as proposed by White (1982). Do note however that treating an inherently ordinal variable, even when transformed via the PCA procedure, as interval does carry with itself certain caveats. In particular, one should be weary when interpreting the estimated standard errors and resulting p-values. In our study therefore we base our inferences mainly on the ordered probit panel specification, while the linear panel GLS specification mainly serves to double-check the general direction and relative magnitude of the estimated marginal effects.

Estimation Results

The estimation results of the basic model are given in Figure 3. We find a positive, and statistically significant, relationship between the number of likes in a post and both cognitive and affective dimensions of attitude, which confirms the hypothesis 1. We also find that number of comments to a post negatively relates to cognitive attitude, but does not have a significant impact on the affective dimension, thus we can only confirm the hypothesis 2b. Contrary to the expectations, the number of comments is important solely for the formation of the cognitive attitude. Additionally, we find that high level of the relationship (as opposed to low level) with the “poster” is positively related to both dimensions of attitude towards the post. Thus we confirm the hypothesis 3. According to the pseudo- R^2 measure of fit (MacFadden 1974) the basic model is more or less as good at explaining the cognitive (pseudo- R^2 : 0.028) as the affective (pseudo- R^2 : 0.03) dimension of attitude. The reader should note that pseudo- R^2 are calculated on the bases of log-likelihoods and not percentage of variance explained, and as such can only be used for model comparison and not as a measure of fit.



To explore hypothesis 4, we interact the number of comments and likes with the dummy variable representing high and low levels of closeness with the “poster” respectively. Specifically, the “comments*high” variable in table 2 is calculated by multiplying the number of comments to the post with dummy variable indicating that the respondent is maintaining a very or quite close relationship with the “sender” of the post. “Comments*low” represents the opposite case indicating the effect of the number of comments on the posts from people with whom the relationship is low (dummy variable for all the other cases except when the relationship is very or quite close). This way of interacting comments and likes with relationship type ensures that our coefficient estimates of the marginal effects are in effect ‘split’ over the two subsamples (i.e. high and low relationship type). The p-values reported therefore represent the results of the test of the hypothesis that the impact of these marginal effects equals naught.

The results of the extended model are presented in table 2. As hypothesized, we observe different dynamics when evaluating posts from people with whom users maintain high vs. low relationship. When the relationship with the “sender” of the post is high, only likes play a significant role for the formation of cognitive attitude. For the affective attitude, no other variable is significant, except for the level of closeness with the “sender” itself. When a post is from someone with whom the relationship is low, both likes and comments play a significant role. These two cues, however, have an opposite impact on the attitude: likes are related positively and significantly with both dimensions of attitude, whereas comments only significantly negatively impact the cognitive one. With the level of closeness per se positively and significantly impacting both dimensions of attitude, it is evident that the closeness heuristic, if present, is usually enough to form the attitude towards the post. Other heuristics, such as comments and likes, are taken into consideration mainly when the main heuristic (the relationship) is low. According to the pseudo- R^2 measure of fit (MacFadden 1974) the extended model is almost as good at explaining the cognitive as the affective dimension of attitude (pseudo- R^2 equal to ca. 0.03 for both dimensions).

| Table 2. Regression Estimation Results (extended model) | | | | | | | |
|--|----------------------|-----|--------------------|-----|-------------------|-----|------|
| Regression: | Panel Ordered Probit | | | | Panel GLS | | VIFs |
| Variable | Affective Attitude | | Cognitive Attitude | | Attitude | | |
| <i>Relationship (high vs. low)</i> | 0.68 (0.139) | *** | 0.5 (0.139) | *** | 1.057 (0.208) | *** | 2.74 |
| <i>Likes*high relationship</i> | 0.023 (0.017) | | 0.04 (0.0173) | ** | 0.061 (0.019) | *** | 1.26 |
| <i>Likes*low relationship</i> | 0.064 (0.013) | *** | 0.057 (0.013) | *** | 0.103 (0.018) | *** | 1.21 |
| <i>Comments*high relationship</i> | -0.01 (0.014) | | -0.022 (0.014) | | -0.04 (0.026) | | 2.10 |
| <i>Comments*low relationship</i> | -0.013 (0.009) | | -0.035 (0.009) | *** | -0.039 (0.014) | *** | 1.63 |
| <i>Constant</i> | | | | | -0.301 (0.129) | ** | |
| <i>rho</i> | 0.155 *** | | 0.238 *** | | 0.18 *** | | |
| <i>chi²</i> | 79.41 *** | | 76.84 *** | | 111.98 *** | | |
| <i>Pseudo-R²</i> | 0.031 | | 0.029 | | | | |
| <i>R²within/between/overall</i> | | | | | 0.14/0.03/0.11 | | |
| <i>Number of observations</i> | 810 | | 810 | | 810 | | |
| significance level *** 1%, ** 5%, standard error in brackets | | | | | | | |

Judging by the results presented in table 2, in the extended model the differences in cognitive as opposed to affective attitudes towards the post are vivid. To assess the likability of a post, level of relationship is important. If the relationship with the “sender” is low, only the amount of likes is positively significant when forming the affective attitude (comments don’t seem to play a statistically significant role in this process). To assess usefulness, all the three heuristic cues are utilized, although their underlying dynamics with respect to the relationship with the “sender” of the post are different. If the relationship with the

sender is low, likes increase the usefulness of the post, whereas comments tend to decrease it. If the relationship is high, only likes have a positive impact on user's attitude, whereas comments do not play any significant role. In addition, we find that that personal characteristics, as measured by ρ - which indicates the percentage of unexplained variance accounted for by the respondent-specific error component, ξ , are more important in determining the cognitive dimension of attitude (ρ : 0.239) than the affective dimension (ρ : 0.155).

In order to account for multicollinearity in our regression analysis, we calculate the variance inflation factors (VIFs), which indicate how much the variance of an estimated regression coefficient is increased because of collinearity. A common rule of the thumb is that if $VIF > 5$ (Kutner 2004), then multicollinearity should be considered a problem. According to the last column in table 2, none of the explanatory variables in our extended model are higher than 3 (with closeness having the highest VIF of 2.74). Note that in order to bypass this limitation imposed by the panel structure of our data – VIF's are calculated for cross-sectional LS regressions only – we calculate the (fixed effects) estimate of the panel GLS specification, explained below, and subtract this from our dependent variable. Afterwards, we estimate a regular GLS specification in order to derive the VIF's.

As outlined above, we also performed a polychoric PCA on the four indicators of attitude pertaining to cognitive and affective dimensions, in order to test our hypothesis via a different method (see figure 3). The extracted principal component is accompanied by an eigenvalue of 3.355, and accounts for 83.9% of the variance in the four indicators, which justifies the reduction of the indicators to a one construct of general attitude. This principal component, which serves as an estimate of the latent variable y^* , is then regressed via Panel Ordinary Least Squares on the variables included in the extended model. The estimation results are given in the table 1 in the column "Panel GLS". We find that the results of the panel GLS estimation generally coincide with the ordered panel probit results, especially in case of the cognitive dimension in the former case. That is, the level of relationship with the "sender" of the post has a significantly positive impact when forming the overall attitude towards the post. In fact, the level of closeness with the "poster" determines the impact of other heuristic cues. Specifically, if the level of the relationship with the "sender" is high, likes positively influence the overall attitude towards the post. If the level of relationship is low, however, likes continue to exert a positive influence, whereas a high amount of comments will have a significantly negative impact on user's overall attitude towards the post.

We conclude that the ordered probit results presented earlier are, in fact, not driven by the employed econometric specification, as they are in line with the results derived through our robust panel GLS approximation for the two dimensions of attitude. Again, it is important to stress that for the purpose of hypothesis testing, we rely solely on the random effects ordered probit as this specification treats our dependent variable as ordinal, which ensures that the standard errors are estimated correctly. The panel GLS specification therefore only serves to double-check the relative values of the estimated coefficients. The reader should note that in this case we see that the standard errors in the panel GLS estimation results, on which the relevant p-value is estimated, are biased downwards, which is evident from the increase in the significance of all estimated coefficient tests when moving from the random effects ordered probit results to the panel GLS results. To conclude, we see that once our four measured indicators of attitude are reduced to one common component, our results are preserved. The overall fit of the model, as measured by the R^2 statistic, is 10.58%, and we infer that the attitude towards a post is mainly driven by some component that is present in all four indicators of attitude.

Post-hoc analysis

As each respondent was presented with different types of posts for evaluation – on average 3 status updates, 2 links and 1 picture, in the post-hoc analysis we test our extended model across the different post types. Specifically, similar to the extended model, two panel ordered probit regressions were tested (one for cognitive and another for affective attitude towards posts of certain type) by restricting the sample of observations to links and status updates, respectively. For photos a non-panel ordered probit regression was conducted as we had just one observation per participant. The results of the post-hoc analysis presented in table 3 reveal significant differences in attitude formation process towards the posts of different type, as well as between their cognitive and affective evaluations.

For the processing of status updates, the closeness as well as the "likes" heuristics are mainly used and notable differences in cognitive vs. affective evaluations can be observed. Solely the likes on the posts with

whom the relationship is “low” have a significant and positive impact on the affective attitude towards status updates. For status updates coming from those with whom relationship is “high”, no heuristic cues are significant. Level of closeness alone is important for cognitive evaluations, but when strengthened by a high number of likes exerts even a higher positive impact on the usefulness evaluations of status updates. In addition, in the case of cognitive evaluations, it seems as the marginal impact of likes for high and low relationships doesn’t differ significantly (p-value for test of coefficient equality: 0.69).

As with the general extended model, for the affective evaluations of links we see that high relationship alone is usually enough to form a favourable attitude, whereas when the relationship is low, the number likes exerts a positive and significant impact on the resulting attitude. On the other hand, comments play an important role when evaluating the usefulness of links. Level of closeness per se is not significant, but is critical in determining the impact of comments on the cognitive attitude: the effect of the number of comments when the relationship is low is negative, but surprisingly enough turns positive if the relationship with the “poster” is high. We note this peculiar finding.

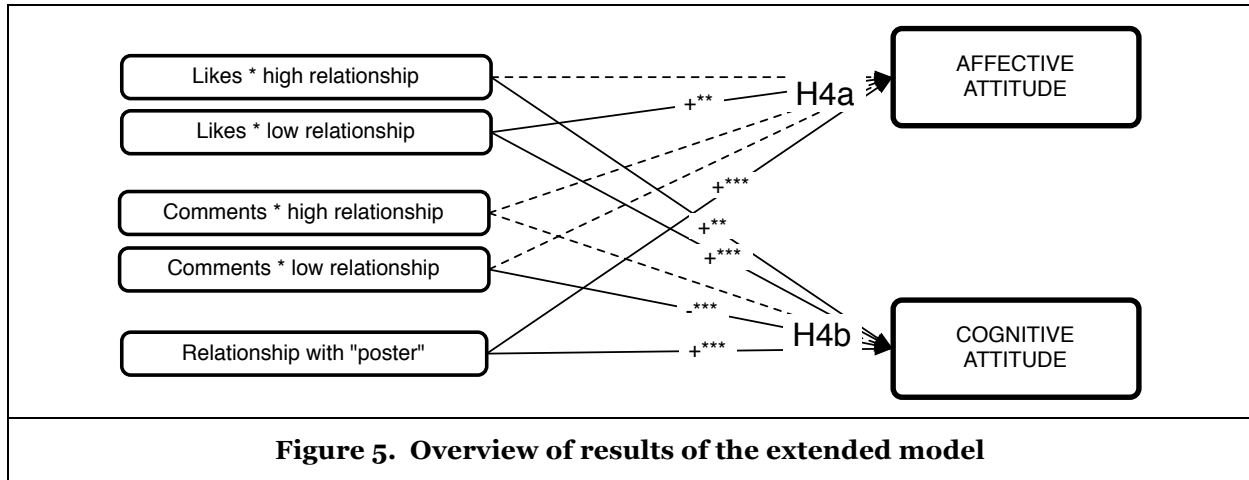
Finally, we consider the evaluation of photos. Before doing so it is important to note that this last set of regression results should be taken carefully. Unlike all other regressions presented so far, the ordinal probit results are not estimated using unobserved heterogeneity corrections – i.e. random or fixed effects – as having only one observation per respondent prohibits this. In its turn this implies that certain individual and unaccounted for confounding factors might bias the presented results. Noting this, we report that for both affective and cognitive evaluations high relationship seems all determining in the case of photos, while likes interacted with high relationship have only a marginal effect on the cognitive evaluations. With low relationships, on the other hand, for both affective and cognitive evaluations, the “likes” heuristic accounts for a good deal of modelled variance.

| Table 3. Regression Estimation Results over different post types | | | | | | |
|---|---------------------|---------------------|---------------------|--------------------|----------------------|--------------------|
| Post Type | Status | | Link | | Photo | |
| Attitude | Affective | Cognitive | Affective | Cognitive | Affective | Cognitive |
| Relationship (high vs. low) | 0.351 (0.227) | 0.394* (0.236) | 0.647*** (0.242) | 0.195 (0.218) | 0.961 *** (0.291) | 1.18*** (0.291) |
| Likes*high relationship | 0.037 (0.029) | 0.059** (0.03) | 0.009 (0.03) | 0.015 (0.029) | -0.038 (0.036) | 0.06* (0.034) |
| Likes*low relationship | 0.055*** (0.017) | 0.045*** (0.018) | 0.074** (0.033) | 0.034 (0.031) | 0.067** (0.029) | 0.097*** (0.03) |
| Comments*high relationship | 0.023 (0.018) | -0.005 (0.019) | -0.012 (0.027) | 0.043* (0.025) | 0.027 (0.05) | 0.034 (0.048) |
| Comments*low relationship | 0.000 (0.012) | -0.011 (0.013) | -0.03 (0.021) | -0.034* (0.019) | -0.033 (0.021) | -0.038 (0.023) |
| <i>rho</i> | 0.126** | 0.249*** | 0.203** | 0.061 | - | - |
| <i>chi</i> ² | 29.95*** | 23.72*** | 21.73*** | 21.26*** | 29.65*** | 40.62*** |
| <i>Pseudo R</i> ² | 0.025 | 0.018 | 0.025 | 0.023 | 0.07 | 0.09 |
| Number of observations | 404 | | 271 | | 135 | |
| significance level *** 1%, ** 5%, * 10%, standard error in brackets | | | | | | |

By differentiating across post types we can observe the similar results to the extended model presented in the table 2. We see that for the formation of the affective attitude, only likes are significant across all post types (and especially with those “posters” with whom the relationship is low). For the cognitive attitude, the impact of likes as well as comments (in the case of links) is evident. We have to note, however, that contrary to expectations, level of closeness is not consistently significant across post types and dimensions of attitude (except for photos). Moreover, by differentiating across post types we can trace how the general attitude towards posts of all types is formed. For example, the negative impact of comments on the cognitive attitude probably results from the significant impact of comments when evaluating links.

Discussion

Our paper makes several important theoretical, methodological and practical contributions. An overview of the confirmed relationships can be traced in figure 5. First, we confirm our hypothesis that users tend to process information heuristically on the Newsfeed where heuristic cues such as the amount of comments and likes, as well as the level of relationship with the “poster” play an important role in the attitude formation process. The level of closeness with the “poster” is by far the mostly used heuristic that, by increasing personal relevance, signals the value of information to the user and thus enhances the attitude towards the post. Our study thus shows that users are primarily looking for information coming from their close friends confirming the bonding function of SNS – relating to the benefits resulting from being connected to people from one’s close social circle recognized by Williams (2006). However, this can be explained by the fact that in the conditions of information overload, level of closeness is the most easily accessible heuristic, that alleviates information processing and helps to form the attitude towards the post coming from close friends and thus stay updated about them.



Our paper shows that likes perform an interesting information filtering function on SNS. By signaling consensus between other receivers of information, they implicitly raise the value of the post and induce others to like it as well – through their actions or attitude – thus causing herding behavior on the network. Likes can be thus compared to ratings in recommender systems (Pearlman 2009), implicitly inducing users to pay more attention to those that are rated highly. Likes are especially utilized to form opinions about the posts coming from those with whom the level of closeness is low, thus providing users with an additional heuristic and the means to overcome increasing information overload on the Newsfeed. By helping to filter the information about less closer people in the network, likes ensure that the user can attain bridging social capital usually coming from a wide spectrum of weak ties (Granovetter 1973). Thus, SNS users are turning to their network of friends for recommendations and opinions (Morris et al. 2010).

Our study shows that, as opposed to likes, comments rather decrease likability and usefulness of the primary post. This is not a very intuitive finding, as comments have been found to signal the popularity of content in chat communication and blogs (Mishne and Glance 2006). Moreover, comments could provide users with the additional information on which to base their opinions about the post. However, our findings imply that an overabundance of comments causes information overload on the Newsfeed – the proposition originally formulated by Schneider et al. (1987). Even though users might be interested information about the “sender”, the additional and often involuntary information coming from others puts an additional strain on processing ability and often results in overload. The feeling of overload forces the users to simply degrade their attitude, instead of engaging in systematic processing to determine ‘who is right and who is wrong’. Jones et al. (2004) confirm that after a certain point the increasing number of messages in online forums has been found to negatively impact participation levels. At the same time, the relationship with the “sender” plays a crucial role in the processing of comments. Users feel overloaded by comments from those they are not close with, whereas comments on the primary posts coming from their closer friends do not have a significant impact. Summarizing, information overload has a social touch on

Facebook: users do not mind a lot of information from those they (are) like, but are very demanding regarding the information coming from others.

Another interesting contribution is the cumulative impact of heuristic cues on the attitude towards the post. We find significant differences in post evaluations depending on whether the post is from someone a user considers to be a close friend or not. Users do not want to process more information than absolutely necessary, and, once presented with a heuristic cue, tend to form their attitude quickly and effortlessly. This relationship-primacy effect, similar to the source-primacy effect recognized by Sundar et al. (2007), is especially evident for the formation of the affective attitude. Closeness is the main heuristic used, as in most cases it is enough to induce users to form a favorable attitude towards the post. When the relationship is not close, the number of likes is considered. For cognitive evaluations, more extensive processing of information is needed. Here we also observe the relationship-primacy effect, whereas at the same time find that heuristic cues can also impact attitudes independently. Specifically, usefulness judgments will be enhanced if the post coming from a close friend also has received a high number of likes. When the post is coming from someone with whom relationship is low, both comments and likes heuristics are employed. However, as these heuristics are differently directed (comments impact attitude negatively, whereas likes are in general positive), their overall impact on the cognitive attitude can not be unambiguously determined.

We find that although highly correlated, cognitive and affective attitudes are subject to distinct information processing mechanisms, revealed by the impact of the heuristic cues on the two dimensions of attitude. Likes play a significant role for the formation of the affective attitude, whereas both comments and likes are necessary for cognitive evaluations. This finding is quite intuitive, as likes signal the affective state of others towards the post, whereas comments, by providing additional information, can be rather of use for cognitive evaluations. This confirms the findings of Ajzen and Sexton (1999), who report that the two dimensions of attitude are subject to distinct psychological mechanisms and urges us to pledge in favor of two-dimensional categorization of attitude. At the same time, the high correlations between the affective and cognitive dimensions of attitude, revealed by the polychoric PCA results suggest that the three dimensions possess a certain overlapping “core” that is responsible for determining the overall attitude towards the posts on the Newsfeed. The fact that we observe similar results when treating attitude multi-dimensionally shows that depending on the goals, attitudes can be measured both uni- and or multidimensionally. Additionally, we notice differences in the formation of attitude based on individual-specific effects. The analysis of ρ introduced in the previous section reveals that affective evaluations are less affected by personal characteristics and are more random, rather depending on various peripheral cues present in the situation. Cognitive attitudes are more solid, based more on the individual characteristics, for example, predisposition to look for information on Facebook or past experience in obtaining useful advice, or certain interests in looking for information (analysis of ρ).

The impact of heuristic cues on the dimensions of attitude differs significantly across posts of different type (post hoc analysis) and allows us to trace the process of attitude formation even more elaborately. In general, while we observe similar effects to the general extended model, the impact of different heuristic cues is more vivid. For example, the level of closeness seems to play an especially important role for the evaluation of photos, and is only marginally important for evaluation of status updates. The relationship-primacy effect is mostly vivid in the impact of cues in the process of affective attitude formation towards links and photos: likes are considered only if the relationship with the “sender” is low. The cue-additivity effect, elaborated upon earlier, can also be observed in the formation of cognitive attitude towards status updates and photos: the high number of likes results in higher usefulness evaluations if strengthened by a high level of relationship, similar to the impact of cues in the process of cognitive attitude formation towards all types of posts. Interestingly, the negative impact of comments is not statistically significant for usefulness evaluations of these two types of posts. It is, however, the only used heuristic in the formation of the cognitive attitude towards links. Moreover, depending on the level of the relationship the impact of comments on the attitude towards links varies: the usual negative impact of comments surprisingly enough turns positive when a post is from someone a user considers to be close with. Thus we can strengthen our proposition of the social touch of information overload: users want as much information as possible from and about those they (are) like, and as least as possible from others.

In terms of methodology, we use a method, which allows us to treat our ordinal dependent variable as ordinal, instead of interval, in the process of hypothesis testing. When using Likert scales in the survey

items, many authors for their analysis make the *oversimplifying* assumption that the scale is equidistant. More specifically, applying regular OLS/GLS regressions to ordinal dependent variables implicitly assumes that the difference between a valuations of e.g. extremely useless and useless as well as useless and somewhat useless, is equal. This amounts to an explicit misspecification of the model, which per definition leads to biased results. By treating our ordinal dependent variable as such we ensure that our estimates do not suffer from this particular problem. In addition, because we observe the same respondents' evaluations over six different posts, we are able to control for all unobserved personal characteristics, doing away with the need to include personal characteristics in our specification in order to control for respondent heterogeneity. We furthermore verify our general results through the application of a robust approximation, namely the panel GLS fixed effects specification with heteroskedasticity robust standard errors. This ensures that our findings are not driven by our specification, but instead reflect a pattern present in the data.

What concerns the practical contribution the efforts of the network providers such as Facebook should be directed towards reducing information overload experienced by users on the network and enhancing their ability to obtain benefits of social capital. In order to prevent users from reducing their activity on the network, network providers should try to motivate them to utilize available functionality, e.g. hiding posts from those they are less interested in. Moreover, our work provides insights for the improvement of filtering algorithms. Our findings show that the most important factors in determining the perceptions of relevance are the level of closeness between users, which is enough to alleviate the feelings of information overload. Thus, filtering mechanisms should make use of information about shared interests, communication intensity, common friends, common city/work/school of users when presenting them with information. As comments are responsible for the creation of information overload, restricting the amount of possible comments or shortening the amount of possible words as is done in Twitter could be implemented. Considering the powerful impact of likes on both dimensions of attitude and across different types of relationship, sorting of the posts on the Newsfeed should be optimized. The algorithms should be adjusted to filter the posts based rather on the amount of likes, than on the amount of comments, as these two cues trigger opposing heuristics and have opposite impact on the attitude.

Conclusion

Our results show that users process information heuristically on their Newsfeed and apply different cues, such as the number of comments and likes as well as the level of relationship with the "poster" – in order to form their attitudes towards the post. In addition, we observe the relationship-primacy effect: level of closeness is the mostly employed heuristic, and only if it is low, it urges users to rely on the number of comments and likes to evaluate the posts on their Newsfeed. The findings of this study can also be applicable to other networks and social media applications, as they uncover the impact of the feedback revealed by comments and likes on the attitude towards the primary post.

One of the limitations of our study is the potential selectivity of our sample, which mainly includes young and active Facebook users. For a large part, this selectivity is dealt with via the inclusion of a respondent specific random (ordered probit) and fixed (panel GLS) effects. We note however that given the continued growing importance of SNS's in individuals' daily lives, there is something to be said for studying exactly this group of young and active respondents. Additionally, the fact that most of our data has been collected through friends of the authors, might represent a certain response bias. However, we aim to deal with this bias by extending the sample with other segments of SNS users.

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